Plants For Slope Stabilization

There is a natural cycle that seems to happen around lake bluffs and other steep slopes. A person moves into his or her new lakefront home and wants to make improvements to the property. So they remove some overgrown brush, maybe rebuild the steps down to the beach, and add a backyard patio to enjoy the lake view and onshore breeze. Six months later the yard is disappearing and the brick pavers in the patio have shifted, and the steps got torn up in the ice last winter. Natural systems have been stabilizing steep slopes for millennia. However, humans seem to have an uncontrollable tendency to remove the plants from the slope. That is exactly the wrong thing to do. Retaining existing vegetation and adding new native plants can greatly increase slope stability. Since Ohio naturally has many steep slopes, we also have native plants that do well on those slopes. Below are some trees, shrubs, and plants that would support the soil of a lake bluff.

Remember that plant communities should be diverse. If you are replanting a slope, pick several different varieties of plants. Not only will this increase visual interest, but it will decrease the pressure of insects and diseases on your plants. Don't try to operate heavy machinery on steep slopes; compaction is a long-term problem, but rolling over your tractor is an immediate risk! Water and mulch should both be applied sparingly to help establish new plantings.

Trees	Shrubs	Grasses and Flowers
Sugar Maple	Grey Dogwood	Pennsylvania Sedge
Cottonwood	Red-osier Dogwood	Bottlebrush Grass
Basswood	Honeysuckle	Canada Wild Rye
Shagbark Hickory	Wild Plum	Panic Grass
Red Oak	Blackhaw	Columbine
White Pine	Sandbar Willow	Blue Phlox
Black Walnut	Purple-osier Willow	Trout Lily
Serviceberry	Witch Hazel	Trillium
Paper Birch	Nannyberry	May Apples
Black Cherry		Prairie seed mixes

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Issue 3 of 4, 2010

Along the Shore

Living With Lake Erie as Your Neighbor

Inside this Edition:
Beaches and bluffs and approaches to stabilizing them

Bluff and Beach Stabilization Techniques

Historically, both private and public landowners, have attempted to protect their property from coastal erosion. This has been accomplished with vegetation, seawalls, revetments, groins and rubble. More recently, detached offshore breakwaters, combined with bluff stabilization measures, have become an increasingly popular way to address coastal erosion and create new beach area. Regardless of what has been installed at the toe of the bluff, landowners must also be aware of the condition of the slope, subsurface drainage characteristics, and overall objective of the chosen protection strategy.

Stabilization practices should be designed by an engineering professional. Permits may be required to install any of these practices. More information on the permitting process appears in Issue 4.

Stabilization techniques vary in effectiveness. It can be difficult to predict all of the consequences of any shore stabilization project. Installation can accelerate erosion on adjoining properties, increase lakebed scour, make swimming areas deeper, and create rip currents. Poorly installed practices can put your own property in danger. Wise landowners should consult a professional instead of trying to install the structures described here. In addition to initial cost, the homeowner should also look at maintenance costs, longevity, and risk management. Some of the more popular techniques for coastal protection are described below.

Revetment Historically a popular bluff stabilization strategy in Lake County, these structures are built at the bottom of the bluff to reduce wave erosion along the shore. They are typically built parallel to the shore with a sloping face. Typically, a layer of filter cloth protects the soil and is covered by a filter layer of small stone and a protective outer layer of larger stone called armor stone. There is usually a transition layer of medium size stone between the armor stone and original soil at the top of the revetment to protect from wave splash and spray. Revetments are best placed away from the water to protect against storm surge or the occasional high water condition. When they are placed at the water's edge, they can cover existing beach area, minimizing the existing natural shore protection.

Seawall These onshore structures are built primarily to reduce wave erosion at the toe of the bluff. They also reduce overtopping and flooding of the land behind the structure. Seawalls are also used to protect the land behind the wall from sliding into the beach or water. Most seawalls will require drainage holes for groundwater drainage to the lake. Common seawall construction materials include concrete,

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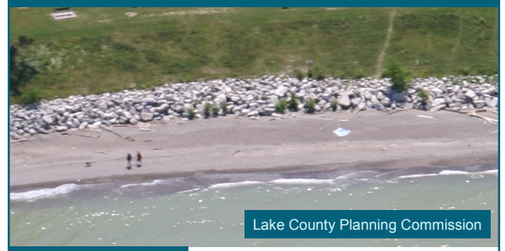
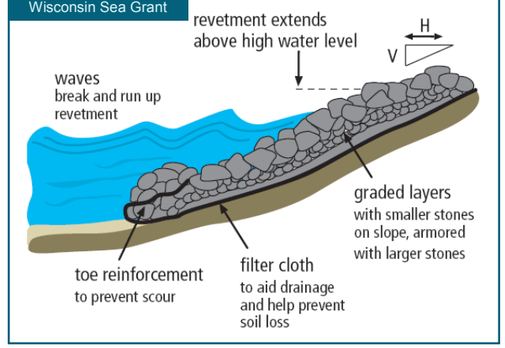
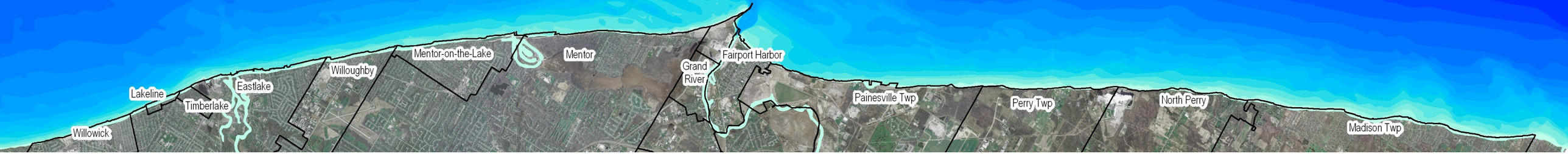
Revetment



Wisconsin Sea Grant





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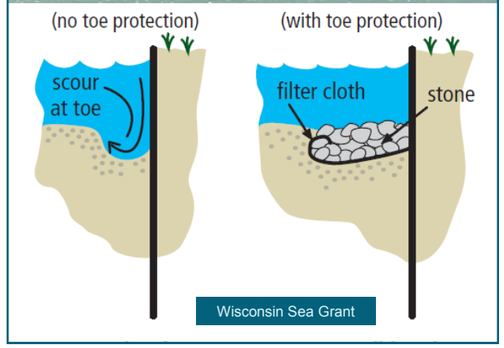
steel sheet pile, and rock filled timber cribs. It should be noted that most seawalls (and revetments) do not produce beaches. Seawalls are also prone to scouring at the base, as wave energy is pushed downward. Revetments and seawalls reduce the natural sand supply for beaches along the shore by preventing erosion of materials that would nourish the beach.

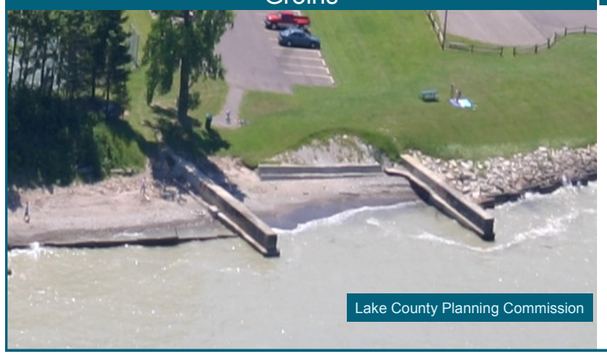
Groin Groins are narrow L-, I-, or T-shaped structures built perpendicular to the shore to retain beach materials. Groins trap sediment carried in the natural west to east currents. Landowners must be aware of this and the potential impact it may have on landowners further down the coast, if they decide to install a groin. A poorly designed or poorly built groin can increase erosion in other areas and rob the longshore current of sediment. Groin installation should include the placement of sand adjacent to the groin to minimize the chance of damage to downshore beaches. Groins are not effective against storms and non-traditional weather patterns or wave directions.

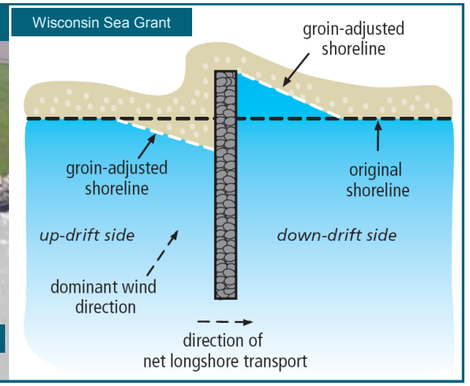
Vegetation Plants play an important role in controlling erosion. Although plants alone cannot protect the shore from wave attack or groundwater seepage, they help prevent soil runoff and wind erosion. The leaves, stems and branches can lessen the impact of wind-driven rain, and trees pull water from the soil. Plants are effective and inexpensive tools that can be used in combination with stabilization structures to preserve the shoreline. Attempts to improve a view by clearing or cutting trees and shrubs from coastal bluff areas may actually create or worsen an erosion situation. Many native plants can be used to help protect slopes from wind and water erosion. See the back of this publication for a partial plant list.

Seawall



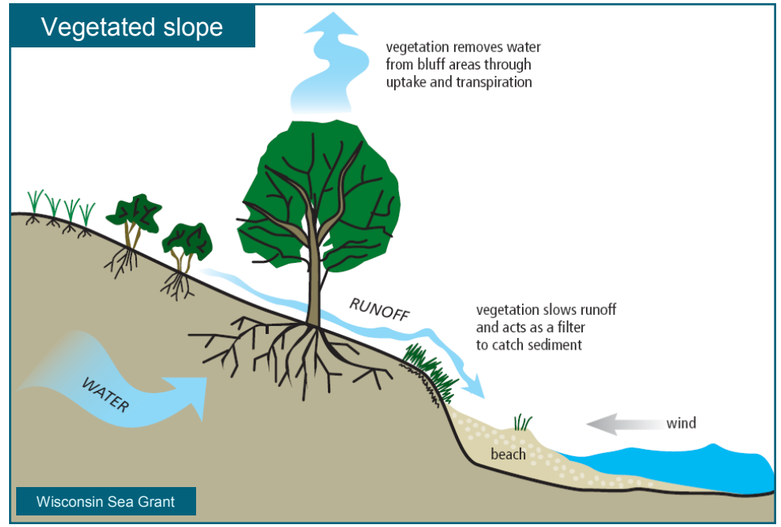
Groins



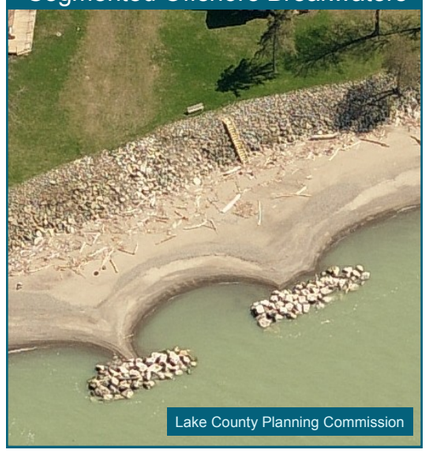


Offshore Breakwaters Breakwaters are designed to reduce wave energy before the waves reach the shore. They create areas of sheltered water that allow sand to settle out. This may maintain or increase usable beach area. Over the past decade, offshore breakwaters have been viewed as an effective option for beach stabilization and as a part of an overall coastal bluff protection strategy. Unlike seawalls and revetments, the offshore locations of properly designed breakwaters are an effective means of beach enhancement. Once a properly designed and constructed breakwater is established, it should maintain the natural movement of sand along the shore. Most breakwaters are placed parallel to the shore and are composed of a rock core and armor stone to absorb and dissipate the wave energy. Offshore breakwaters are ideal for shallow, low profile sites, such as those that tend to exist in eastern Lake County. The Lake County Coastal Development Plan encourages residents to consider this technique.

Vegetated slope



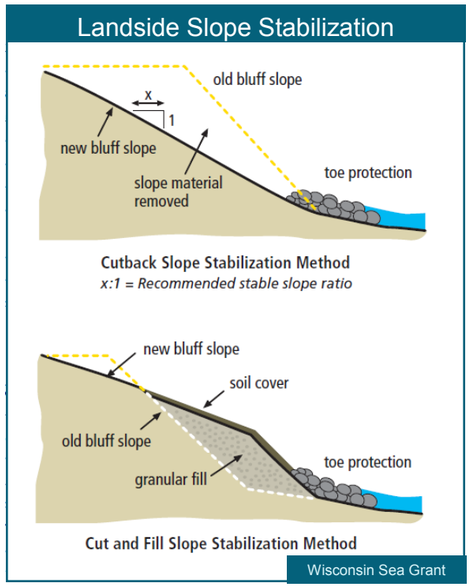
Segmented Offshore Breakwaters



Landside Slope Stabilization In addition to the toe protection strategies discussed above, protecting bluffs from significant deep slips will require additional design and earthwork. Slopes can be reshaped if there is ample land between buildings and the coast and the toe of the slope is stable.

Landowners and/or their consultants should consult with the local regulatory agencies before pursuing any of the protection strategies listed here.

Landside Slope Stabilization



A lake is the landscape's most beautiful and expressive feature -Henry David Thoreau